



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/787,204

02/27/2004

Toshihisa Nozawa

09459.0001

4678

22852 7590 02/21/2008  
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER  
LLP  
901 NEW YORK AVENUE, NW  
WASHINGTON, DC 20001-4413

EXAMINER

DHINGRA, RAKESH KUMAR

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

02/21/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/787,204	<b>Applicant(s)</b> NOZAWA ET AL.	
	<b>Examiner</b> RAKESH K. DHINGRA	<b>Art Unit</b> 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 19-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 19-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 2/27/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/20/07 has been entered.

### ***Response to Arguments***

Applicant's arguments with respect to claims 2, 3, 6-9, 11-18 have been considered but are moot in view of the new ground(s) of rejection as explained hereunder.

Applicant has cancelled all pending claims 2, 3, 6-9 and 11-18, and replaced by new claims 19-30.

Accordingly claims 19-30 are now pending and active.

New references by Wang et al (US Patent No. 6,787,054) and Brown et al (US PG PUB No. 2002/0066535) when combined with Koshimizu read on new independent claim 19. Accordingly claim 19 and dependent claims 20, 22, 23, 25 and 26 have been rejected under 35 USC 103 (a) as explained below. Balance claims 21, 24 and 27-30 have also been rejected under 35 USC 103 (a) as explained below.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 19, 20, 22, 23, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al (US Patent No. 6,787,054) in view of (Koshimizu (US Patent No. 6,162,323) and Brown et al (US PG PUB No. 2002/0066535).**

Regarding Claim 19: Wang et al teach a plasma processing method comprising:

delivering a substrate 25 to be plasma-processed into a process chamber 105;

introducing a process gas 135 into said process chamber while an inside of said process chamber 105 is evacuated by a an exhaust port 170 in said process chamber;

plasma-processing said substrate; and

introducing, after said substrate is plasma-processed, a cleaning gas 155 into said process chamber 105 while the inside of said process chamber is evacuated by the exhaust port 170 thereby cleaning the inside of said process chamber (e.g. Fig. 2 and col. 4, line 55 to col. 5, line 65).

Wang et al do not teach a second exhaust port that is positioned lower than the first exhaust port.

Koshimizu teaches a plasma processing method comprising:

A processing vessel 104 for processing a substrate W, a gas inlet ports 136, 144 with gas source unit 142 (gas introducing mechanism), an electrode 116 (holding mechanism) for holding a substrate W horizontally on its surface, first exhaust line with exhaust port 608 positioned higher than substrate surface and second exhaust line with second exhaust port 602 and wherein the first and second exhaust ports 608, 602 are connected to a common pump 606 (e.g. Fig. 4 and col. 10, lines 5-65).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide a second exhaust port (for exhausting the cleaning gas) as taught by Koshimizu in the apparatus of Wang et al to obtain independent control of process and cleaning gas exhausting lines.

Wang et al in view of Koshimizu teach second exhaust port but do not teach that the second exhaust port is positioned lower than the first exhaust port.

Brown et al teach et al teach a plasma processing method including apparatus comprising a process chamber 25 having an exhaust port in the bottom wall of the process chamber and having an exhaust pipe 85 with an exhaust throttle valve attached thereto. Brown et al further teach that positioning the exhaust tube 85 in the bottom wall and with an exhaust throttle valve 80 reduces the possibility of a back flow of effluent gas from entering and contaminating the process chamber 25 because the pressure in the exhaust tube 85 is lower than the pressure in the process chamber (e.g. Fig. 2 and para. 29). It would be obvious to provide the second exhaust valve adjacent or in the bottom wall of the process chamber in the apparatus of Wang et al in view of Koshimizu to minimize any backflow of cleaning gases into the process chamber.

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to provide the second exhaust valve at a position lower than the first exhaust valve as taught by

Brown et al in the apparatus of Wang et al in view of Koshimizu to minimize any backflow of cleaning gases into the process chamber.

Regarding Claim 20: Wang et al in view of Koshimizu and Brown et al teach that second exhaust port is positioned lower than the surface of the substrate 35 (Brown et al – Fig. 2).

Regarding Claims 22, 25: Wang et al in view of Koshimizu and Brown et al teach that inside of process chamber can be exhausted by the first and second exhaust ports (through pump 606) when cleaning gas is introduced in the processing chamber (Koshimizu – Fig. 4 and col. 10, lines 35-40).

Regarding Claims 23, 26 – Wang et al teach that the cleaning gas is a reactive gas (col. 13, lines 6-18).

**Claims 21, 28, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al (US Patent No. 6,787,054) in view of (Koshimizu (US Patent No. 6,162,323) and Brown et al (US PGPUB No. 2002/0066535) as applied to claims 19, 20, 22, 23, 25, 26 and further in view of Takagi et al (US Patent No. 6,402,847).**

Regarding Claim 21: Wu et al in view of Koshimizu and Brown et al teach all limitations of the claim (as already explained above under claim 19) including that the substrate 25 can be moved up/down with the help of lift pins and a pneumatic mechanism 245 (Wang et al – Fig. 2 and col. 7, lines 22-35), and further that the substrate W along with susceptor 116 is movable in up/down direction (Koshimizu et al – Fig. 4 and col. 5, lines 25-40) and further that second exhaust port is positioned lower than the substrate surface during cleaning.

Wu et al in view of Koshimizu and Brown et al do not teach substrate is moved up during plasma processing such that first exhaust port is positioned higher than the surface of the substrate.

Takagi et al teach a plasma processing method including a processing chamber 1 where the substrate is movable up/down during etching and cleaning operations. Takagi et al further teach that

during dry processing, the distance between the shower head 7 and the lower electrode 2 is made to differ between the film forming operation and the cleaning operation and more specifically, during the cleaning operation, the distance is widened, that is, during processing the substrate is moved upward and during cleaning the same is downward. Takagi et al also teach that during processing the first exhaust port is positioned higher than the surface of the substrate , and a large amount of gas such as C.sub.2 F.sub.6 is allowed to flow. Takagi et al further teach that during substrate processing the substrate is moved upwards such that first exhaust port 12 is positioned higher than the surface of the substrate W (e.g. Figs. 1, 2 and col. 7, line 1 to col. 8, line 32).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to position the first exhaust port at a position higher than the substrate surface as taught by Takagi et al in the apparatus of Wu et al in view of Koshimizu and Brown et al to provide a uniform flow of the process gas in the entire pumping channel, and also reducing the cleaning time.

Regarding Claims 28: Wang et al in view of Koshimizu and Brown et al teach that inside of process chamber can be exhausted by the first and second exhaust ports (through pump 606) when cleaning gas is introduced in the processing chamber (Koshimizu – Fig. 4 and col. 10, lines 35-40).

Regarding Claim 29: Wang et al teach the cleaning gas is a reactive gas (col. 13, lines 6-18).

**Claims 24, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al (US Patent No. 6,787,054) in view of (Koshimizu (US Patent No. 6,162,323) and Brown et al (US PG PUB No. 2002/0066535) as applied to claims 19, 20, 22, 23, 25, 26 and further in view of Shen et al (US Patent No. 6,797,188).**

Regarding Claims 24, 27: Wu et al in view of Koshimizu and Brown et al teach all limitations of the claim (as already explained above under claim 19) including use of RF energy during processing and cleaning steps.

Wu et al in view of Koshimizu and Brown et al do not teach use of microwaves during cleaning of the process chamber.

Shen et al teach a plasma cleaning method for cleaning a process chamber and where either RF or microwave energy can be used (claim 13).

Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to supply microwave energy into the process chamber during cleaning of the process as taught by Shen et al in the apparatus of Wu et al in view of Koshimizu and Brown et al as an equivalent means for generating plasma for cleaning of the process chamber.

In this connection courts have ruled:

Substitution of equivalents requires no express motivation. *In re Fount*, 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152, USPQ (CCPA 1967).

**Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al (US Patent No. 6,787,054) in view of (Koshimizu (US Patent No. 6,162,323), Brown et al (US PG PUB No. 2002/0066535) and Takagi et al (US Patent No. 6,402,847) s applied to claims 21, 28, 29 and further in view of Shen et al (US Patent No. 6,797,188).**

Regarding Claim 30: Wu et al in view of Koshimizu, Brown et al and Takagi et al teach all limitations of the claim (as already explained above under claim 19) including use of RF energy during processing and cleaning steps.

Wu et al in view of Koshimizu, Brown et al and Takagi et al do not teach use of microwaves during cleaning of the process chamber.

Shen et al teach a plasma cleaning method for cleaning a process chamber and where RF or microwave energy can be used (claim 13).



Therefore it would have been obvious to one of ordinary skills in the art at the time of the invention to supply microwave energy into the process chamber during cleaning of the process as taught by Shen et al in the apparatus of Wu et al in view of Koshimizu, Brown et al and Takagi et al as an equivalent means for generating plasma for cleaning of the process chamber.

In this connection courts have ruled:

Substitution of equivalents requires no express motivation. *In re Fount*, 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152, USPQ (CCPA 1967).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RAKESH K. DHINGRA whose telephone number is (571)272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Rakesh K Dhingra/  
Examiner, Art Unit 1792

/Karla Moore/

Application/Control Number: 10/787,204  
Art Unit: 1792

Page 9

Primary Examiner, Art Unit 1792